

REMARKS

Claims 1, 3, 4, 8-26 and 29-37 remain pending after amendment.

Claim Amendments

By this amendment, claims 2 and 5-7 are cancelled and the limitations thereof added to claim 1. Claims 27 and 28 are also cancelled, and the limitations thereof added to claim 26. The dependencies of the claims are amended accordingly. No new matter is added by this amendment.

Allowable Subject Matter

Applicants thank the Examiner for the indication of allowable subject matter of claims 20-25. However, applicants believe that all pending claims are directed to allowable subject matter in view of the above amendments and the following remarks.

Objection to Drawings

The Examiner objects to Figure 1 as containing reference numeral “19” which is not described in the specification.

In response, a substitute Figure 1 is submitted herewith in which reference numeral “19” is deleted. The noted objection is thus moot and should be withdrawn.

Rejection of Claims 1-18 and 26-37 under 35 USC 103(a)

Claims 1-18 and 26-37 stand rejected under 35 USC 103(a) as being unpatentable over Abouav '653 in view of Slykhouse '855. This rejection is respectfully traversed.

Ahouav discloses a conventional arrangement of detonators being provided in blastholes and linked by a control signal path which takes the form of conductor wires (for instance, denoted as "20" in Figure 2).

Slykhouse discloses an apparatus for determining the detonation velocity of an explosive. The apparatus consists of a resistance type detonation velocity gauge comprising a resistance element sealed within a thin walled metal sleeve. In use the gauge is placed beside an explosive to be detonated, with detonation causing the sleeve of the gauge to collapse progressively as detonation proceeds. In turn this causes a change in resistance along the gauge as the sleeve collapses. This change in resistance can be measured and a velocity of detonation calculated (see column 1, lines 39-57).

It is fundamental according to Slykhouse that the resistance type detonation velocity gauge is provided adjacent to, but in isolation from, the explosive to be detonated and the accompanying control signal path that is used to cause detonation of the explosive. This arrangement is perhaps best illustrated with reference to Figure 1. Figure 1 illustrates an explosive which contains an electrically actuated detonator 16. The detonator is coupled to a magnetic type firing device 20 by means of an electrical cable 18. This is clearly explained at column 2, lines 1-5. The detonation velocity gauge 10 is provided adjacent to the detonator and is coupled by leads 22, 24 to the input of an oscilloscope 32. It is evident from Figure 1 that the circuitry associated with the detonation velocity gauge 10 is completely independent of the

control signal path 18 that is responsible for initiation of the detonator 16. The detonation velocity gauge is in no way *coupled to* the control signal path 18 associated with the detonator. The function of the detonation velocity gauge is in no way linked to the control signal path 18 associated with the detonator. Detonation of the explosive 14 does, however, have an influence on the detonator velocity gauge, causing the sleeve of the gauge to collapse progressively, with this collapse being detected as a change of resistance by the oscilloscope.

In contrast, the present invention uses changes in one or more blast feature monitoring parameters of a monitoring signal transmitted on the control signal path extending between the blast controller and detonators. This point may be illustrated with reference to applicants' Figure 1.

Figure 1 depicts a plurality of blast holes 14.1 to 14.n in which there is provided an electric or electronic detonator 16.1 to 16.n, respectively. Each detonator 16.1 to 16.n is connected by a respective branch lead conductor arrangement 18.1 to 18.n to a main lead conductor arrangement 20, which in turn is connected to a blast controller 22.

Each of blast holes 14.1 to 14.n is filled with a body of a main charge 24.1 to 24.n. In use, the detonators 16.1 to 16.n are programmed and/or controlled by the blast controller 22 by transmitting control and programming data on conductor arrangement 20 and 18.1 to 18.n. A velocity of detonation measurement system 26 uses changes in one or more blast feature monitoring parameters of a monitoring signal that is transmitted on the conductor arrangement 20 and 18.1 to 18.n, and which acts as a blast feature transducer or sensor, to determine the velocity of detonation. The monitoring parameters may include phase, amplitude frequency or

changes in differences between values of similar signal parameters of a first signal and second or derivative signal.

It will be appreciated from the above that the velocity of detonation measuring system 26 relies on changes in signals on the control signal paths that are used to control initiation of the detonators. This situation is fundamentally different from the apparatus taught in Slykhouse – in Slykhouse there is no physical connection between the detonation velocity gauge and the control signal path (wire) that is used to control actuation of the detonator. This fundamental difference is evident when one compares Figure 1 of Slykhouse with applicants' Figure 1.

The fundamental difference between the invention of Slykhouse and that described above in connection with the present invention is now reflected in the amended claims.

Amended claim 1 now requires that a blast feature signal communication path extends from at least one detonator hole region to communicate a blast feature signal relating to at least one feature of the respective shot of the blast to a blast feature monitoring station. Claim 1 now also requires that the blast feature signal is generated by at least one sensor which is connected to one of the main conductor arrangements and any of the respective conductor arrangements. This last feature, in particular, represents an important distinction over the disclosure of Slykhouse.

This feature is also reflected in claims 16 and 30. Thus, claim 16 (a method claim) requires generating a monitoring signal in the conductor arrangements (connected to a detonator for providing blast control signals to the detonator from a remote blast controller).

Amended claim 30 incorporates the feature that the system comprises a monitoring signal generator arranged to generate a monitoring signal in the conductor arrangement (connected to the detonator for controlling operation of the detonator from a remote blast controller).

Claim 26 has been amended to incorporate the features of previous claims 27 and 28. Thus, it is now a requirement that the sensor (which is sensitive to a feature of the blast) comprises a device connected to a conductor arrangement which is connected to the detonator.

There is no suggestion or disclosure in Slykhouse that the detonation velocity gauge should be linked to the signal control path that is used to control initiation of the detonator and, indeed, it is submitted that such linkage would be inherently incompatible with how the detonation velocity gauge of Slykhouse is intended to function. Therefore, it is submitted that the combination of Abouav and Slykhouse does not render obvious the present invention as defined in the pending claims.

The rejection is thus improper and should be withdrawn.

Rejection of Claim 19 under 35 USC 103(a)

Claim 19 stands rejected under 35 USC 103(a) as being unpatentable over Abouav '653 in view of Slykhouse '855 and Hill et al '438. This rejection is respectfully traversed.

At the outset, it will be noted that claim 19 depends from claim 16. As discussed above, claim 16 reflects those fundamental differences that exist between the present invention and Slykhouse. Claim 19 is thus patentable for the same reasons that claim 16 is patentable as discussed above.

The rejection is thus improper and should be withdrawn.

In view of the above, the application is believed to be in condition for allowance, and an early indication of same earnestly is solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Raymond C. Stewart (Reg. No. 21,066) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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RCS/LWH/ej

Respectfully submitted,

By 

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